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Michael Goessel

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DICKE, BILLIG & CZAJA  
FIFTH STREET TOWERS  
100 SOUTH FIFTH STREET, SUITE 2250  
MINNEAPOLIS, MN 55402

EXAMINER

MCMAHON, DANIEL F

ART UNIT

PAPER NUMBER

2117

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/577,288	<b>Applicant(s)</b> GOESSEL ET AL.	
	<b>Examiner</b> DANIEL F. MCMAHON	<b>Art Unit</b> 2117	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 28 May 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 35-53 and 55-58 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 53 is/are allowed.
- 6) ☒ Claim(s) 35-52 and 55-58 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 28, 2009 has been entered.

This action is in response to the amendment filed May 28, 2009.

Claims 30 – 34, 59, and 60 are cancelled.

Claims 35 and 53 have been amended.

Claims 35 – 53 and 55 – 58 are pending in the application.

### ***Response to Amendment***

2. The rejection of claim 53, under 35 U.S.C. 112, second paragraph, is withdrawn in light of amendment to the claims.

3. The rejection of claims 59 and 60 is moot in light of the cancellation of the claims.

***Response to Arguments***

4. Applicant's arguments filed May 28, 2009 have been fully considered and are not persuasive.

5. Regarding the rejection of claim 35, under 35 U.S.C. 103(a), as anticipated by Hasegawa et al. U.S. Publication 2004/0246337 (herein Hasegawa), in view of Meaney, U.S. Patent 6,055,660 (herein Meaney):

6. Regarding Applicant's argument: "Hasegawa does not teach that a second signature can be calculated of each data word." Applicant claims the scan chain compression unit outputs serial data that is not a signature of a data word. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., non-serial data word signatures) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Additionally, compression is a well known technique for the generation of scan chain signatures.

7. Regarding applicant's argument: "Implementing MISR B in the scan compression unit 2 of Hasegawa would lead to completely different circuit and a completely different function than Hasegawa." In response to applicant's argument, the fact that applicant

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has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

8. Regarding applicant's argument: "MISR B cannot be described by the equation  $z(t+1) = Bz(t) \text{ XOR } y(t)$  because the MISR B does not have the data word  $y(t)$  as input." Applicant argues that because MISR A computes the signature of Bus A and MISR B computes the signature of Bus B, therefor MISR A and MISR B are not in parallel. However, Bus A and Bus B are being tested for synchronization (column 2, lines 56 - 57). Therefor MISR A and MISR B will receive the same data as a result, Bus A transmits data  $y(t)$  and Bus B transmits the data  $y(t)$ , as claimed.

### ***Claim Rejections - 35 USC § 103 (Old)***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 35 – 37, 39, 41 - 45, 48 - 52, and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al. U.S. Publication 2004/0246337 (herein Hasegawa), in view of Meaney, U.S. Patent 6,055,660 (herein Meaney).

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11. Regarding claim 35, Hasegawa teaches: an evaluation circuit for detecting and/or locating faulty data words in a data stream  $T_n$  (abstract) comprising: a first linear automaton circuit and a second linear automaton circuit connected in parallel (figure 4, element 2, element 16), each having a set of states, wherein the first linear automaton circuit and the second linear automaton circuit have a common input line for receiving a data stream  $T_n$  comprising  $n$  successive data words  $y(1), \dots, y(n)$  each having a width of  $k$  bits,  $k > 1$ , (figure 4); a first logic combination gates arranged downstream of the first linear automaton circuit and also a second logic combination gates arranged downstream of the second linear automaton circuit, (figure 4, element 4, element 6); the logic combination gates are designed such that the signature respectively calculated by the linear automaton circuit can be compared with a predeterminable good signature and a comparison value can be output (paragraph 65, lines 35 – 38; paragraph 66, lines 32 – 35); and the first linear automaton circuit and the second linear automaton circuit are designed such that a first signature and a second signature, respectively, can be calculated of each data word (paragraph 0066, page 5, lines 15 – 17).

Hasegawa does not explicitly teach: the first linear automaton circuit can be described by the following equation  $z(t + 1) = Az(t) \text{ XOR } y(t)$ ; the second linear automaton circuit can be described by the following equation  $z(t+ 1) = Bz(t) \text{ XOR } y(t)$ ; and where  $A$  and  $B$  represent the state matrices of the linear automaton circuits, where the state matrices  $A$  and  $B$  can be inverted, and where the dimension  $L$  of the state vectors is  $\geq k$ .

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Meaney teaches: the first linear automaton circuit can be described by the following equation  $z(t + 1) = Az(t) \text{ XOR } y(t)$  (column 3, lines 23 – 33, table 2); the second linear automaton circuit can be described by the following equation  $z(t + 1) = Bz(t) \text{ XOR } y(t)$  (column 3, lines 23 – 33, table 2); and where A and B represent the state matrices of the linear automaton circuits, where the state matrices A and B can be inverted, and where the dimension L of the state vectors is  $\geq k$  (column 3, lines 23 – 33; table 2).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa: a first linear automaton circuit and a second linear automaton circuit connected in parallel, and a first logic combination gates arranged downstream of the first linear automaton circuit and a second logic combination gates arranged downstream of the second linear automaton circuit, with the teaching of Meaney: a linear automaton circuit can be described by the following equation  $z(t + 1) = Az(t) \text{ XOR } y(t)$  and A can be inverted, for the purpose of creating a test vector signature for comparison purposes (abstract, lines 4 – 7). A first linear automaton circuit, also known as a Multiple-input Shift Register (MISR) with the function  $z(t + 1) = Az(t) \text{ XOR } y(t)$  is a well known design choice in the art, and the use of the well known design choice would yield predictable results.

12. Regarding claim 36, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: the logic combination gates are present as exclusive-OR gates whose first inputs are respectively connected to the

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outputs of the associated linear automaton circuit and to whose second inputs good signatures can be applied.

Meaney teaches: the logic combination gates are present as exclusive-OR gates whose first inputs are respectively connected to the outputs of the associated linear automaton circuit and to whose second inputs good signatures can be applied. (figure 2, element 13, element 22)

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa, a first and second logic combination gate, with the teaching of Meaney, a first and second logic combination gate as an XOR gate. The use of XOR logic gates for comparison is well known in the art (column 4, line 13, element 22) and the combination would yield a predictable result.

13. Regarding claim 37, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: arranged upstream of the first linear automaton circuit is a first coder, that encodes the data word  $y(i)$  having the data word length of  $k$  bits into an encoded data word  $ul(i)$ ,  $ul(i)=Cod1$  having the word width of  $K1$  bits, for  $i=1, \dots, n$ , and where  $Cod1$  represents the encoding function of the first coder.

Meaney teaches: arranged upstream of the first linear automaton circuit is a first coder, that encodes the data word  $y(i)$  having the data word length of  $k$  bits into a coded data word  $ul(i)$ ,  $ul(i)=Cod1$  having the word width of  $K1$  bits, for  $i=1, \dots, n$ , and where  $Cod1$  represents the encoding function of the first coder (figure 2, element 21).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa, an evaluation circuit, as cited above, with the teaching of Meaney: a first coder upstream of the first linear automation circuit for the purpose of detection of errors introduced independent of the design under test. Data encoders are a well known technique in the art for detecting errors in data. One of ordinary skill in the art, at the time of the invention, would have recognized the application of the known technique would have yielded predictable results.

14. Regarding claim 39, Hasegawa and Meaney teach the limitations of the parent claim, claim 37. Hasegawa does not explicitly teach: arranged upstream of the second linear automaton circuit is a second coder, which encodes the data word  $y(i)$  having the data word length of  $k$  bits into an encoded data word  $u_2(i)$ ,  $u_2(i) = \text{Cod}_2(y(i))$  having the word width of  $K_2$  bits, for  $i=1, \dots, n$ , and where  $\text{Cod}_2$  represents the encoding function of the second coder.

Meaney teaches: arranged upstream of the second linear automaton circuit is a second coder (figure 2, element 21'), which encodes the data word  $y(i)$  having the data word length of  $k$  bits into an encoded data word  $u_2(i)$ ,  $u_2(i) = \text{Cod}_2(y(i))$  having the word width of  $K_2$  bits, for  $i=1, \dots, n$ , and where  $\text{Cod}_2$  represents the encoding function of the second coder (figure 2, element 21').

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa, an evaluation circuit, as cited above, with the teaching of Meaney: a second coder upstream of the second linear automation

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circuit for the purpose of detection of errors introduced independent of the design under test. Data encoders are a well known technique in the art for detecting errors in data. One of ordinary skill in the art, at the time of the invention, would have recognized the application of the known technique would have yielded predictable results.

15. Regarding claim 41, Hasegawa and Meaney teach the limitations of the parent claim, claim 39. Hasegawa does not explicitly teach: the word width  $K1$  of the data words  $u1(i)$  encoded by the first coder is equal to the word width  $K2$  of the data words  $u2(i)$  encoded by the second coder.

Meaney teaches: the word width  $K1$  of the data words  $u1(i)$  encoded by the first coder is equal to the word width  $K2$  of the data words  $u2(i)$  encoded by the second coder (figure 2, element 23, element 23').

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa, an evaluation circuit, as cited above, with the teaching of Meaney: the first coder and second coder having the same data output width for the purpose of providing symmetric data protection for the first and second path. It is a well known design technique to replicate logic units to minimize design and test of logic elements. One of ordinary skill in the art at the time of the invention would recognize that applying the known technique would yield predictable results.

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16. Regarding claim 42, Hasegawa and Meaney teach the limitations of the parent claim, claim 39. Hasegawa does not explicitly teach: the first coder matching the second coder with regard to its construction and its function.

Meaney teaches: the first coder matching the second coder with regard to its construction and its function. (figure 2, element 23, element 23')

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa, an evaluation circuit, as cited above, with the teaching of Meaney: the first coder and second coder having the same construction and function. It is a well known design technique to replicate logic units to minimize design and test of logic elements. One of ordinary skill in the art at the time of the invention would recognize that applying the known technique would yield predictable results.

17. Regarding claim 43, Hasegawa and Meaney teach the limitations of the parent claim, claim 39. Hasegawa does not explicitly teach: the word width  $K1$  of the data words  $u^1(i)$  encoded by the first coder and the word width  $K2$  of the data words  $u^2(i)$  encoded by the second coder are in each case equal to the word width  $k$  of the data words  $y(1), \dots, y(n)$  of the data stream  $T_n$ .

Meaney teaches: the word width  $K1$  of the data words  $u^1(i)$  encoded by the first coder and the word width  $K2$  of the data words  $u^2(i)$  encoded by the second coder are in each case equal to the word width  $k$  of the data words  $y(1), \dots, y(n)$  of the data stream

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Tn. (figure 2, element 25, element 22, element 23, element 25', element 22', element 23')

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa, an evaluation circuit, as cited above, with the teaching of Meaney: the first coder and second coder having the same data width of  $u^1(i)$  and  $u^2(i)$  as  $y(i)$ . It is a well known design technique to replicate logic units to minimize design and test of logic elements. One of ordinary skill in the art at the time of the invention would recognize that applying the known technique would yield predictable results.

18. Regarding claim 44, Hasegawa and Meaney teach the limitations of the parent claim, claim 39. Hasegawa does not explicitly teach: the encoding functions Cod1 and Cod2 of the first coder and of the second coder are designed as follows:

$$\text{Cod1}(y_1(i), y_2(i), \dots, y_k(i)) = P1(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$$

$$\text{Cod2}(y_1(i), y_2(i), \dots, y_k(i)) = P2(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$$

For  $i, 1, \dots, n$  where the number of zeros situated at the end of  $P1(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$  is equal to  $(K1-k)$ , where the number at the end of  $P2(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$  is equal to  $(K2-k)$ , and where  $P1$  represents an arbitrary permutation of the  $K1$  components of  $(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$  and  $P2$  represents an arbitrary permutation of the  $K2$  components of  $(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$  (figure 2, element 23, element 24, element 23', element 24').

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Meaney teaches: the encoding functions Cod1 and Cod2 of the first coder and of the second coder are designed as follows:

$$\text{Cod1}(y_1(i), y_2(i), \dots, y_k(i)) = P1(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$$

$$\text{Cod2}(y_1(i), y_2(i), \dots, y_k(i)) = P2(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$$

For  $i, 1, \dots, n$  where the number of zeros situated at the end of  $P1(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$  is equal to  $(K1-k)$ , where the number at the end of  $P2(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$  is equal to  $(K2-k)$ , and where  $P1$  represents an arbitrary permutation of the  $K1$  components of  $(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$  and  $P2$  represents an arbitrary permutation of the  $K2$  components of  $(y_1(i), y_2(i), \dots, y_k(i), 0, \dots, 0)$  (figure 2, element 23, element 24, element 23', element 24').

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as cited above, with the teaching of Meaney, zero padding of code words. Zero padding of code words is a known technique in the art, and the combination would yield predictable results.

19. Regarding claim 45, Hasegawa and Meaney teach the limitations of the parent claim, claim 37. Hasegawa does not explicitly teach: the coding functions Cod1 and Cod2 of the first coder and of the second coder are designed as follows:

$$\text{Cod1}(y_1(i), y_2(i), \dots, y_k(i)) = P1(y_1(i), y_2(i), \dots, y_k(i), b_1^1 \dots, b_{K1}^1)$$

$$\text{Cod2}(y_1(i), y_2(i), \dots, y_k(i)) = P2(y_1(i), y_2(i), \dots, y_k(i), b_1^2 \dots, b_{K1}^2)$$

and where  $P1$  and  $P2$  represent arbitrary permutations.

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Meaney teaches: the coding functions Cod1 and Cod2 of the first coder and of the second coder are designed as follows:

$$\text{Cod1}(y_1(i), y_2(i), \dots, y_k(i)) = P1(y_1(i), y_2(i), \dots, y_k(i), b_1^1 \dots, b_{K1}^1 k)$$

$$\text{Cod2}(y_1(i), y_2(i), \dots, y_k(i)) = P2(y_1(i), y_2(i), \dots, y_k(i), b_1^2 \dots, b_{K1}^2 k)$$

and where P1 and P2 represent arbitrary permutations (figure 2, element 23, element 24, element 23', element 24').

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as cited above, with the teaching of Meaney, padding of code words with  $b_1^n \dots, b_{K1}^n k$ . Padding of code words in a known technique in the art, and the combination would yield predictable results.

20. Regarding claim 48, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: the state matrix A of the first linear automaton circuit and the state matrix B of the second linear automaton circuit are related to one another as follows:  $B = A^n$  where  $n \neq 1$ .

Meaney teaches: the state matrix A of the first linear automaton circuit and the state matrix B of the second linear automaton circuit are related to one another as follows:  $B = A^n$  where  $n \neq 1$  (table 2)

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as cited above, with the teaching of Meaney, matrix  $B = A^n$  where  $n \neq 1$ . Inverted matrices

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are a well known design choice in MISR design is well known in the art, and combination would yield predictable results.

21. Regarding claim 49, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: the state matrix B of the second linear automaton circuit is equal to the inverted state matrix  $A^{-1}$  of the first linear automaton circuit.

Meaney teaches: the state matrix B of the second linear automaton circuit is equal to the inverted state matrix  $A^{-1}$  of the first linear automaton circuit (table 2).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as cited above, with the teaching of Meaney, matrix  $B = A^{-1}$ . Inverted matrices are a well known design choice in MISR design is well known in the art, and combination would yield predictable results.

22. Regarding claim 50, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: the first linear automaton circuit is designed as a linear feedback shift register and the second linear automaton circuit is designed as an inverse linear feedback shift register, both linear automaton circuits having a parallel input.

Meaney teaches: the first linear automaton circuit is designed as a linear feedback shift register and the second linear automaton circuit is designed as an

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inverse linear feedback shift register, both linear automaton circuits having a parallel input (table 2).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as cited above, with the teaching of Meaney, the linear automaton circuits as linear feedback shift registers. Implementation of a linear automaton circuit as a linear feedback shift register is a well known design choice in the art and the combination would yield a predictable result.

23. Regarding claim 51, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa additionally teaches: the first linear automaton circuit is designed as a linear feedback, multi-input shift register or the second linear automaton circuit is designed as a linear feedback, multi-input shift register. (figure 4, element 16, element 2)

24. Regarding claim 52, Hasegawa and Meaney teach the limitations of the parent claim, claim 52. Hasegawa additionally teaches: the multi- input shift registers have a primitive feedback polynomial of maximum length (paragraph 0081).

25. Regarding claim 55, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa additionally teaches: the evaluation circuit is monolithically integrated on an integrated circuit (abstract).

26. Claims 38, 40, 46, and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa and Meaney, in view of Applicant Admitted Prior Art (herein AAPA).

27. Regarding claim 38, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: the following holds true for the encoding function of the first coder:

$$\text{Codl } (y'(i)) = \text{ul}(i) (D f_1(e(i))), \text{ or}$$

$$\text{Cod1 } (y'(i)) = \text{Cod1 } (y(i) \text{ XOR } e(i)) = \text{Cod1 } (y(i) \text{ XOR } f_1(e(i)))$$

where a function  $f_1$  by  $f_1(0) = 0$  exists for  $y'(i) = y(i) \text{ XOR } e(i)$ , and where a function  $f_1^{-1}$  where  $f_1^{-1}(f_1(e)) = e$  exists for all binary data words  $e$  having the word width  $k$  which may occur as errors of a data word, where  $e$  denotes a faulty data word of the data stream  $T_n$ ,

AAPA teaches: the following holds true for the encoding function of the first coder:

$$\text{Codl } (y'(i)) = \text{ul}(i) (D f_1(e(i))), \text{ or}$$

$$\text{Cod1 } (y'(i)) = \text{Cod1 } (y(i) \text{ XOR } e(i)) = \text{Cod1 } (y(i) \text{ XOR } f_1(e(i)))$$

where a function  $f_1$  by  $f_1(0) = 0$  exists for  $y'(i) = y(i) \text{ XOR } e(i)$ , and where a function  $f_1^{-1}$  where  $f_1^{-1}(f_1(e)) = e$  exists for all binary data words  $e$  having the word width  $k$  which may occur as errors of a data word, where  $e$  denotes a faulty data word of the data stream  $T_n$  (page 6, lines 14 – 18).

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A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, with a first coder upstream of a first linear automation circuit, with the teaching of AAPA:, as cited above. Linear block codes, as defined above, are well known technique in the art for error detection correction. One of ordinary skill, at the time of the invention, would have recognized that application of the known technique would yield predictable results.

28. Regarding claim 40, Hasegawa and Meaney teach the limitations of the parent claim, claim 39. Hasegawa does not explicitly teach: the following holds true for the encoding function of the second coder:

$$\text{Cod2}(y'(i)) = u_2(i) \sim f_2(e(i)), \text{ or}$$

$$\text{Cod2}(y'(i)) = \text{Cod2}(y(i) \cdot e(i)) = \text{Cod2}(y(i)) \cdot f_2(e(i))$$

where a function  $f_2^{-1}$  where  $f_2^{-1}(f_2(e)) = e$  exists for all binary data words  $e$  having the word width  $k$  which may occur as errors of a data word, where  $e$  denotes a faulty data word of the data stream  $T_n$ .

AAPA teaches: the following holds true for the encoding function of the second coder:

$$\text{Cod2}(y'(i)) = u_2(i) \sim f_2(e(i)), \text{ or}$$

$$\text{Cod2}(y'(i)) = \text{Cod2}(y(i) \cdot e(i)) = \text{Cod2}(y(i)) \cdot f_2(e(i))$$

where a function  $f_2^{-1}$  where  $f_2^{-1}(f_2(e)) = e$  exists for all binary data words  $e$  having the word width  $k$  which may occur as errors of a data word, where  $e$  denotes a faulty data word of the data stream  $T_n$  (page 6, lines 14 – 18).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, with a first coder upstream of a first linear automation circuit, with the teaching of AAPA:, as cited above. Linear block codes, as defined above, are well known technique in the art for error detection correction. One of ordinary skill, at the time of the invention, would have recognized that application of the known technique would yield predictable results.

29. Regarding claim 46, Hasegawa and Meaney teach the limitations of the parent claim, claim 37. Hasegawa does not explicitly teach: the encoding function Cod1 of the first coder is designed such that it realizes a linear block code,  $f1=Cod1$ .

AAPA teaches: the encoding function Cod1 of the first coder is designed such that it realizes a linear block code,  $f1=Cod1$  (page 6, lines 14 – 18).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, with a first coder upstream of a first linear automation circuit, with the teaching of AAPA:, as cited above. Linear block codes, as defined above, are well known technique in the art for error detection correction. One of ordinary skill, at the time of the invention, would have recognized that application of the known technique would yield predictable results.

30. Regarding claim 47, Hasegawa and Meaney teach the limitations of the parent claim, claim 39. Hasegawa does not explicitly teach: the encoding function Cod2 of the second coder is designed such that it realizes a linear block code,  $f2=Cod2$ .

AAPA teaches: the encoding function Cod2 of the second coder is designed such that it realizes a linear block code,  $f2=Cod2$  (page 6, lines 14 – 18).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, with a first coder upstream of a first linear automation circuit, with the teaching of AAPA:, as cited above. Linear block codes, as defined above, are well known technique in the art for error detection correction. One of ordinary skill, at the time of the invention, would have recognized that application of the known technique would yield predictable results.

31. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa and Meaney, in view of Eldridge et al., U.S. Publication 2001/0052786 (herein Eldridge).

32. Regarding claim 56, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: A load board for receiving at least one needle card for testing integrated circuits or having at least one test socket for testing integrated circuits or for connecting a handler to a tester of integrated circuits, the load board having an evaluation circuit.

Eldridge teaches: A load board for receiving at least one needle card for testing integrated circuits (paragraph 0075).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as

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cited above, with the teaching of Eldridge, a load board for receiving a needle card. A load board from receiving a needle card is well known in the art and one of ordinary skill in the art, at the time of invention, would recognize the combination would yield predictable results.

33. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa and Meaney, in view of Beer, U.S. Publication 2002/0153918 (herein Beer).

34. Regarding claim 57, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: a needle card for testing integrated circuits.

Beer teaches: a needle card for testing integrated circuits (abstract).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as cited above, with the teaching of Beer, a needle card. A needle card is well known in the art and one of ordinary skill in the art, at the time of invention, would recognize the combination would yield predictable results.

35. Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa, Meaney, and Eldridge, in view of Davis et al., U.S. Patent 6,194,910 (herein Davis).

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36. Regarding claim 58, Hasegawa and Meaney teach the limitations of the parent claim, claim 35. Hasegawa does not explicitly teach: a tester for testing integrated circuits having the following features: the tester is provided with a plurality of instruments for generating signals or data streams and with a plurality of measuring sensors, in particular for currents and voltages; the tester has a load board which is provided for receiving at least one needle card for testing integrated circuits and/or for connecting a handler to a tester of integrated circuits and/or which is equipped with at least one test socket for testing integrated circuits.

Eldridge teaches: the tester has a load board which is provided for receiving at least one needle card for testing integrated circuits and/or for connecting a handler to a tester of integrated circuits and/or which is equipped with at least one test socket for testing integrated circuits (paragraph 0075).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as cited above, with the teaching of Eldridge, a load board for receiving a needle card. A load board from receiving a needle card is well known in the art and one of ordinary skill in the art, at the time of invention, would recognize the combination would yield predictable results.

Eldridge does not explicitly teach: the tester is provided with a plurality of instruments for generating signals or data streams and with a plurality of measuring sensors, in particular for currents and voltages.

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Davis teaches: the tester is provided with a plurality of instruments for generating signals or data streams and with a plurality of measuring sensors, in particular for currents and voltages (abstract).

A person of ordinary skill in the art, at the time of the invention, would find it obvious to combine the teachings of Hasegawa and Meaney, an evaluation circuit, as cited above, with the teaching of Davis, a tester for measurement of voltage and current. A tester for measurement of voltage and current is well known in the art and one of ordinary skill in the art, at the time of invention, would recognize the combination would yield predictable results.

### ***Allowable Subject Matter***

37. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record fails to disclose or teach:

undergoing transition to the state  $z^2(n+1) = S_2(L2, y(1) \dots, y(i-1), y(i), y(i+1) \dots, y(n))$  if no error can be detected in the case of the data words  $u_2(1), \dots, u_2(i-1), u_2(i), u_2(i), \dots, u_2(n)$ ,

undergoing transition to the state  $z^2(n+1) = S_2(L2, y(1), \dots, y(i-1), y(i), y'(i), y(i+1), \dots, y(n))$  if an error is present at least in the case of the i-th position of the coded data words  $u_2(1) \dots u_2(i-1), u_2'(i), u_2(i) \dots, u_2(n)$ ,

the signature of an error-free data stream  $T_n$  being designated by  $S(L2, y(1), \dots, y(i-1), y(i), y(i+1), \dots, y(n))$  and the signature of a faulty data stream  $T_n$  being designated by  $S(L2, y(1), \dots, y(i-1), y'(i), \dots, y(n))$ ,

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determining the signature differences  $\Delta S1$  and  $\Delta S2$  by means of exclusive-OR logic combinations of the signatures  $S1$  and  $S2$  with ascertained good signatures, in each case according to the following specifications:

$$\Delta S1 = S(L1, y(1), \dots, y(i-1), y(i), y(i+1), \dots, y(n))$$

$$\text{XOR } S(L1, y(1), \dots, y(i-1), y'(i), y(i+1), \dots, y(n))$$

$$\Delta S2 = S(L2, y(1), \dots, y(i-1), y(i), y(i+1), \dots, y(n))$$

$$\text{XOR } S(L2, y(1), \dots, y(i-1), y'(i), y(i+1), \dots, y(n))$$

determining a unique solution for the position  $i$  of the faulty bit in the faulty data word by solving the equation  $f_1^{-1}(A^{i-n} \Delta S1) = f_2^{-1}(B^{i-n} \Delta S2)$

and if no unique solution results for  $1 \leq i \leq n$ , outputting a notification by means of an output medium that two or more errors are present in the data stream  $T$ , under consideration,

determining a unique solution for the counter  $e(i)$  of the faulty data word  $y'(i)$  in the data stream  $T_n$  by solving the equation

$$e(i) = f_1^{-1}(A^{i-n} \Delta S1)$$

outputting the position  $i$  of the faulty bit in the faulty data word and also the error  $e(i)$  of the faulty data word  $y'(i)$  in the data stream  $T_n$  by means of an output medium.

### **Conclusion**

38. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Dworski et al U.S. Patent 7,391,349

Hasegawa et al. U.S. Publication 2004/0246337

Cote et al. U.S. Publication 2004/0003329

Mattes U.S. Patent 5,224,107

Lim et al. U.S. Patent 6,483,373

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL F. MCMAHON whose telephone number is (571)270-3232. The examiner can normally be reached on M-Th 8am-5pm(EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Ellis can be reached on (571) 272-4205. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Kevin L Ellis/

Supervisory Patent Examiner, Art Unit 2117